U-6A / NU-1B System

U-6A / NU-1B Technical Support Contract

Aircraft Inspection Report

December 19, 2003

Document Number: 2003 NU-1B 0001
Issue: NC
Contract Number: N00019-01-D-0103
Delivery Order Number: 0003
CDRL Sequence Number: A001

Prepared by: L-3 Communications MAS (US) Corporation (L-3 MAS US)
[formerly Bombardier Services America Corporation]
One Bombardier Way
Bridgeport, WV
26330
CAGE 1KAM7

Mark Matteson, Project Supervisor, L-3 MAS US _____ Date

UNCLASSIFIED

DESTRUCTION NOTICE.
For classified documents, follow the procedure in DoD 5200.22-M, "Industrial Security Manual", section 11-19 or DoD 5200.1-R, "Information Security Regulation", Chapter IX. For unclassified, limited documents, destroy by any method that will prevent disclosure of contents or reconstruction of the document."

Revision History

Issue	**Date**	**Summary of Changes**
NC	December 19, 2003	Preliminary Draft

TABLE OF CONTENTS

CONFORMITY INSPECTION REPORT

1.0 NU-1B Airplane System

L-3 Communications MAS (US) Corporation (L-3 MAS US) [formerly Bombardier Services America Corporation] and Viking Air, Ltd. inspected the USNTPS NU-1B airplane and associated documentation for the following:

Material condition of the basic airframe, repairs, and modifications. Particular note was paid to effects of USNTPS-specific modifications, such as flight test instrumentation, on the basic airframe.

Incorporation of FAA Airworthiness Directives and manufacturer's service bulletins in the airplanes as currently maintained.

Configuration differences between USNTPS airplane and civil-specification DHC-3 airplanes.

L-3 MAS US has prepared a written report on the inspection results. The report states:

The material condition of the airplanes

The status of maintenance documentation

Status of the incorporation of applicable Airworthiness Directives and service bulletins

Configuration changes that would be required to convert these military-standard airplanes to conform to FAA civil certified DHC-2 standard.

L-3 MAS US will provide a written report for a ROM budgetary estimate to make any suggested repairs and/or upgrades to the NU-1B. This report will be delivered in accordance with CDRL A002.

2.0 Inspection Standards

The standards that were used for the NU-1B inspection was the DeHavilland DHC-3 Otter Flight Manual 1-3-1, Maintenance Manual 1-3-2, Service Bulletins, Engineering Bulletins and Technical News Sheets; and FAA Airworthiness Directives. Federal Aviation Regulations, Part 43 Maintenance and Inspections; and Part 91 General Operating Rules, were used to assist in establishing and clarification of the standards.

3.0 Hours Spent on Assignments

3.1. Conducting Technical Investigations and analysis of system performance.

3.2. Preparation of reports and recommendations for correction of deficiencies.

3.3. Time spent on travel status during normal and overtime work hours.

Date	L-3 MAS US Project Supervisor			Viking AME #1			Viking AME #2		
	3.1	**3.2**	**3.3**	**3.1**	**3.2**	**3.3**	**3.1**	**3.2**	**3.3**
Sep 28			6						
Sep 29	8								
Sep 30	2	2	6						
Nov 15						14			14
Nov 16			6						
Nov 17	8.5		6	8.5			8.5		
Nov 18				9			9		
Nov 19				9.5			9.5		
Nov 20			6	10			10		
Nov 21		9		2	6.5		2	6.5	
Nov 22			6			16			16
Dec 6		6							
Dec19		4							
Totals:	18	21	36	41	6.5	30	41	6.5	30

Table 3.0: Hours Spent on Assignments

Total hours spent in Technical Investigations:	100
Total hours spent in preparation of reports and recommendations:	34
Total hours spent in travel:	96

4.0 Status of Maintenance Documentation

The NU-1B airplane maintenance documentation system in place is designed specifically for the US Navy aviation maintenance community. The tracking and filing processes that are currently in place ensure that most of the maintenance requirements are being addressed in a timely manner.

Records discrepancies relating to engine overhaul and maintenance were immediately corrected:

- Last overhaul entry on repair/rework card for R1340-S1H1-G engine, S/N 42-14822, identified last overhaul as accomplished on June 24, 1988. The FAA engine logbook identified the last overhaul as accomplished on December 13, 1994. The Equipment Operating Log recorded the installation of the engine on November 21, 1997, with a Time Since Overhaul (TSO) of 0.0 hours.
- Engine maintenance records did not contain an entry for an engine inspection performed as the result of a propeller strike on March 21, 2001.

The incumbent maintenance contractor maintains the active airplane records in a neat and legible condition. When L-3 MAS US asked for access to records and planning documentation, the requested information was easily retrieved and accurate.

5.0 Material Condition of the NU-1B Airplane

5.1. General Observations

The NU-1B aircraft was inspected by L-3 MAS US in accordance with the 8th 100 hour inspection detailed in the DHC-3 Maintenance Manual. Contract maintenance personnel have been inspecting the aircraft on the DeHavilland inspection cycle. However, we noted some areas of the aircraft require more attention. These areas are detailed later in this report.

The aircraft need to be lubricated in a more diligent manner. We found several areas that were dry or lacked lubrication, causing premature component wear.

Interior and exterior protective paint applications were noted as being in poor condition. Exterior paint is too thick and makes crack and defect detection difficult.

Workmanship and standards of sheet metal repairs leave opportunities for repairs to fail or cracks to continue to propagate. Existing sheet metal repairs should be reviewed by comparison with the repair schemes in the DHC-3 Repair Manual, and reworked if necessary.

Aft cabin and fuselage areas need to be cleaned and maintained in a clean condition so that inspections and defect detection may be more easily accomplished.

Interior panels and upholstery have been in service for many years but remains in a serviceable condition.

5.2. Differences from FAA Requirements

Many sheet metal repairs performed on the NU-1B airplane were not referenced in the maintenance records available during the inspection. From our civilian FAA point of view, L-3 MAS US determined these repairs did not conform to the DHC-3 Repair Manual, and some were performed in such a manner that they did not meet the FAA requirements found in Federal Aviation Regulation (FAR) Part 43:

> **§43.13 Performance rules (general).**
>
> (a) Each person performing maintenance, alteration, or preventive maintenance on an aircraft, engine, propeller, or appliance ***shall use the methods, techniques, and practices prescribed in the current manufacturer's maintenance manual or Instructions for Continued Airworthiness prepared by its manufacturer, or other methods, techniques, and practices acceptable to the Administrator*****,** except as noted in §43.16. He shall use the tools, equipment, and test apparatus necessary to assure completion of the work in accordance with accepted industry practices. If special equipment or test apparatus is recommended by the manufacturer involved, he must use that equipment or apparatus or its equivalent acceptable to the Administrator.
>
> (b) Each person maintaining or altering, or performing preventive maintenance, ***shall do that work in such a manner and use materials of such a quality, that the condition of the aircraft, airframe, aircraft engine, propeller, or appliance worked on will be at least equal to its original or properly altered condition*** (with regard to aerodynamic function, structural strength, resistance to vibration and deterioration, and other qualities affecting airworthiness).

5.3. Damage History

The history of NU-1B Airplane No. 30 (DeHavilland S/N 151) is documented back to September 28, 1956. During our inspection, special attention was given to areas of the airframe with prior damage history.

5.3.1. Rough Field Forced Hard Landing

Around October 20, 1981, the aircraft experienced a rough field forced hard landing, with the following damages recorded in the maintenance documents:

- Center fuselage stringers and skin damaged around Fuselage Station (FS) 264
- Visual inspection of the engine mount revealed one bent arm
- Fuselage damaged from FS 427 to FS 467.5
- Port elevator was replaced
- Hydraulic strut was replaced
- Aircraft symmetry changed

5.3.2. Hard Landing

On October 22, 1984, the aircraft experienced a hard landing, with the following damages recorded in the maintenance documents:

- Deformation of the right main landing gear upper strut attachment at the fuselage frame doubler;
- Doubler cracked and buckled at FS 109
- Skin rivets sheared (moved up 1 rivet diameter)
- Exterior skin wrinkled
- Fuselage landing gear truss assembly support wrinkled, including "H" member and adjacent bulkhead (PSM 1-3-4, Figure 20, page 86, detail 1E)
- Cracked intercostals forward end (support for filter) at FS 85, where stick cable goes through
- Crack in battery support shelf
- Attaching rivets loose on air vents for the port cylinder head cowling
- Wing attaching bolts failed NDI (bolts were replaced)

Repairs appear to have been carried to RH MLG attach structure, specifically at the lower portion of the bulkhead support mount assemble at station #110. There appears to be no approved repair scheme in the structural repair manual.

5.4. Results of Inspection

NOTE: The items in this section were noted by personnel contracted to inspect the aircraft using civilian standards. For the purposes of this report, "unapproved" means not in accordance with DeHavilland DHC-3 manuals.

Items highlighted in red (discrepancies) are items that L-3 Communications MAS (US) Corporation identified as requiring action prior to further flight. These items were noted as needing corrective actions at the briefing conducted on 21 November, 2003.

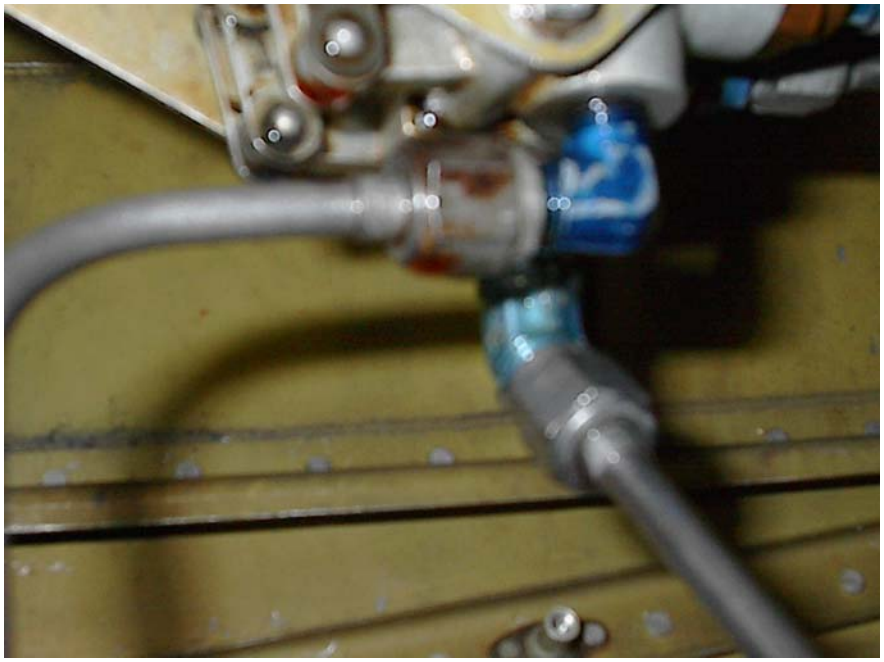
Items highlighted in yellow (discrepancies) are items that L-3 Communications MAS (US) Corporation identified as requiring action at the next scheduled maintenance interval. These items were also noted at the briefing conducted on 21 November, 2003.

Photographers have been incorporated in this report as an aid for the personnel conducting corrective actions. Please note, not all discrepancies have a corresponding photograph.

5.4.1. Fuselage

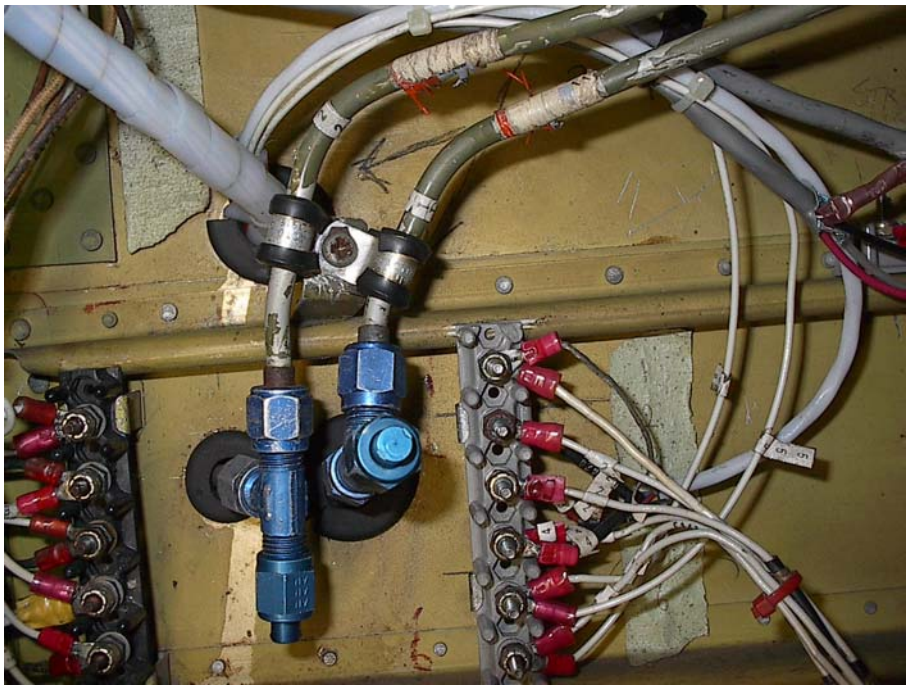
5.4.1.1. ***Elevator/rudder quadrant assy mounted on STN 110 sloping bulkhead ---2 ¼ bolts require lock wire.***

5.4.1.2. ***Check parking brake valve for hydraulic leak (fluid residues on valve).***

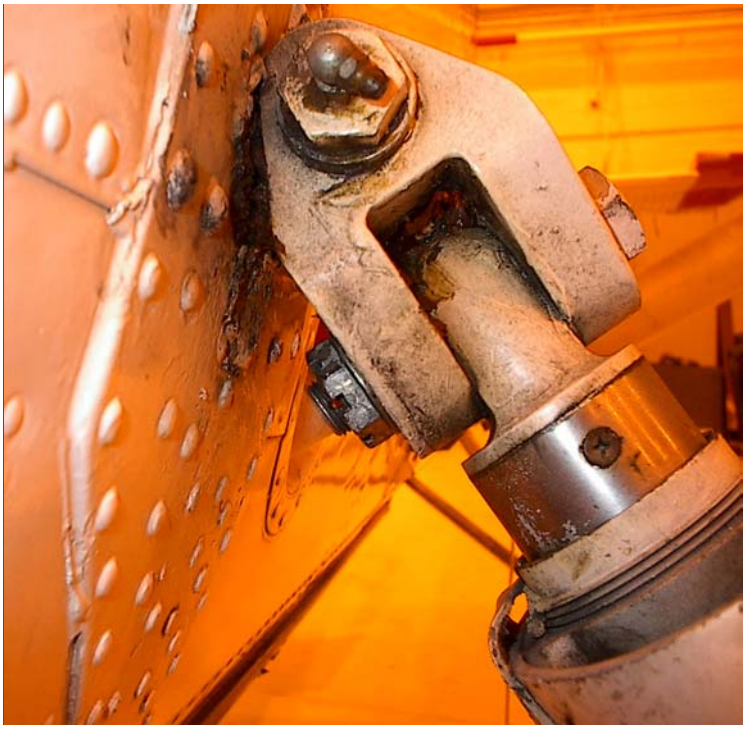


5.4.1.3. ***Aft fuel feed tube is chafing on sump plate bolt head in area of MLG drag struts---requires inspection. Possible replacement if beyond 10% wall thickness.***

5.4.1.4. ***Pilot/Static system missing drain pipes. Part # C2F 691A as per Illustrated Parts Catalogue, pg. 74***



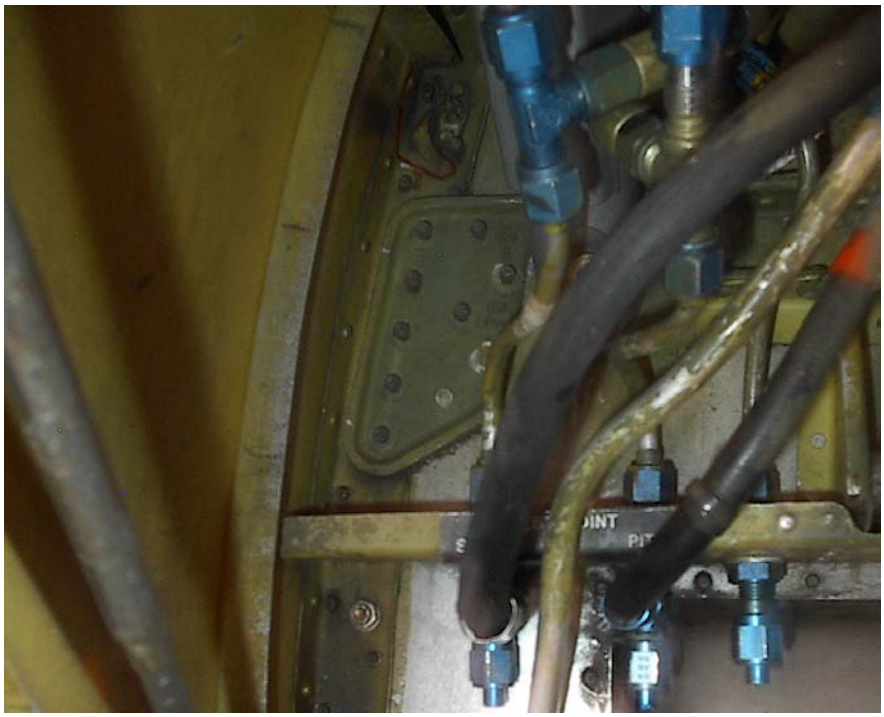
5.4.1.5. No cotter pins on L/H and R/H shock strut to fuse attach points.



5.4.1.6. ***3 cracked sleeves on 3 separate hyd. lines leading to flap jack. 1 line currently leaks.***

5.4.1.7. Sheetmetal repair required on sub floor (rear tank cover)

5.4.1.8. Crack on LH Aft side of firewall directly opposite of engine cowling support bracket.



5.4.1.9. ***Pilots rudder pedal assemblies worn at connecting rod attachment (no picture)***

5.4.1.10. ***Loose/worn bolt in pilot's rudder pedal assembly.(no picture)***

5.4.1.11. ***Rudder torque tube attach bolts do not have castlated nuts installed. (no picture)***

5.4.1.12. ***Damaged screw in loose captivated nut in rear fuel bay at sub floor #4 RH AFT corner.***

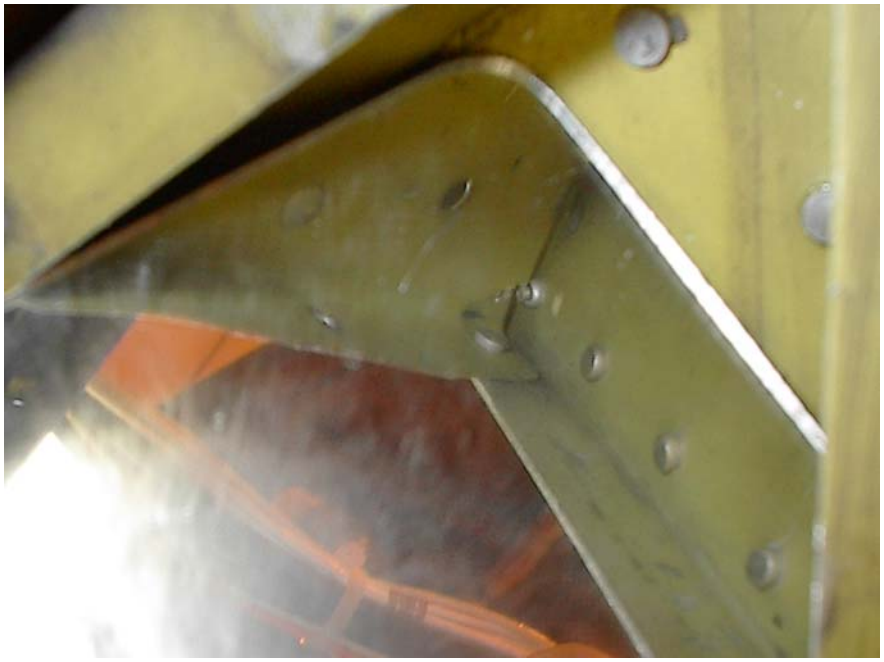
5.4.1.13. ***Excessive air in flap hyd. system requires bleeding as per DHC-3 M.M. (no picture)***

5.4.1.14. ***Cracked angle STN. 264 R/H side near pulley quadrant for rudder/elevator attached to C3FS77-47 support assy. I.P.C. pg. 92 Item-10 (no picture)***

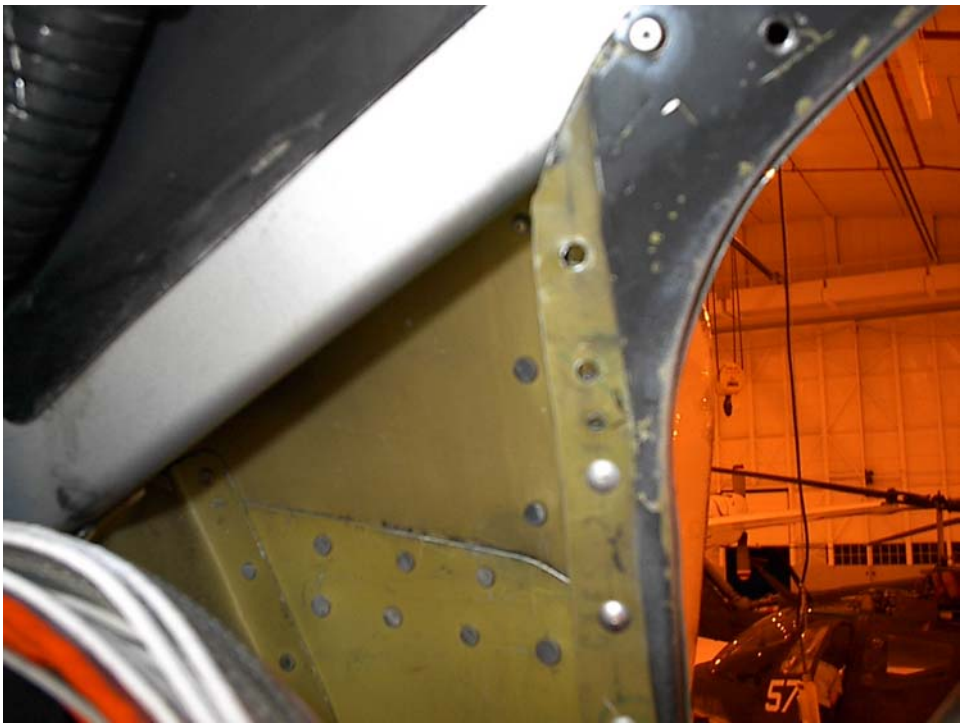
5.4.1.15. ***Horizontal stabilizer incidence control chain and sprockets worn out. Pin-C3CF318-6, C3CF225-3, C3CF224-3 (no picture)***

5.4.1.16. 6 missing rivets, Co-pilot side behind radio panel, under co-pilot window retaining strip.

5.4.1.17. Co-pilot R/H kick panel cross member angle cracked where it mates to entry door former.



5.4.1.18. 2 missing rivets near co-pilot hand hold assy.



5.4.1.19. Corrosion starting in ceiling stringer just aft of STN. 171.8 L/H side.

5.4.1.20. Corrosion starting in fuselage skin near roof mounted Ant. STN 204-220. Check seals around Ant. and treat corrosion.

5.4.1.21. R/H rear jump seat lower attach point bracket is cracked.

5.4.1.22. Sheet metal crack in L/H LNG shock strut cuff upper fairing.

5.4.1.23. R/H and L/H jump seat floor attach point "tang" is broken. I.P.C. pg. 244 Item-25

5.4.1.24. Floor rails have multiple corrosion spots and 1 crack as marked.

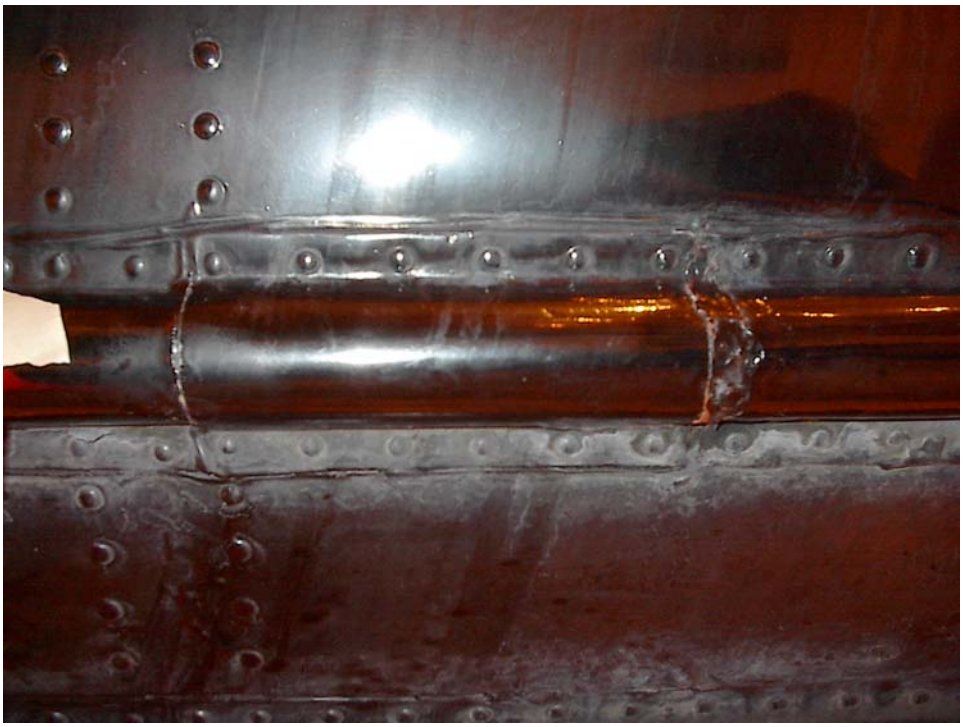
5.4.1.25. Cockpit 3 --- Instrument vacuum hoses cracked and deteriorating.

5.4.1.26. Cabin sub floor #1 has a 1 ½ crack at the AFT bulkhead attach.

5.4.1.27. Cabin sub floor #2 has hole in LH AFT skin next button snap.

5.4.1.28. Cabin sub floor #4 has 1 stripped anchor nut at forward LH corner

5.4.1.29. 2 unapproved splices to hat section strips Fwd fuse bottom R/H side. Not I.A.W. SRM Fig 4-13 pg.67



5.4.1.30. 1 unapproved repairs to STA 93.0 Lower. R/H former. Not I.A.W. SRM Fig 4-9 pg. 63 DHC-3 S.R.M.

5.4.1.31. 2 unapproved repairs to STA 83.25 Lwr R/H former not I.A.W. SRM Fig. 4-9 pg.63 SRM.

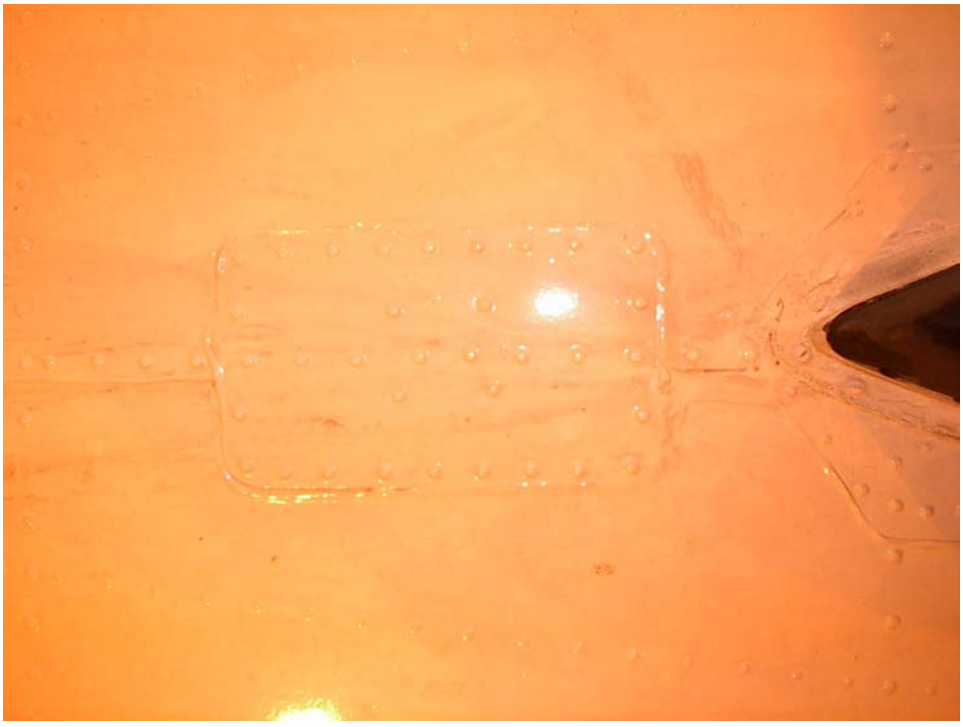
5.4.1.32. Unapproved repair of stringer in roof of A/C between STN. 237.0-253.5 not I.A.W. SRM pg.70 fig. 4-16. (no picture)

5.4.1.33. Floor panel assy starboard rear part #C3FS310-11 badly deformed.

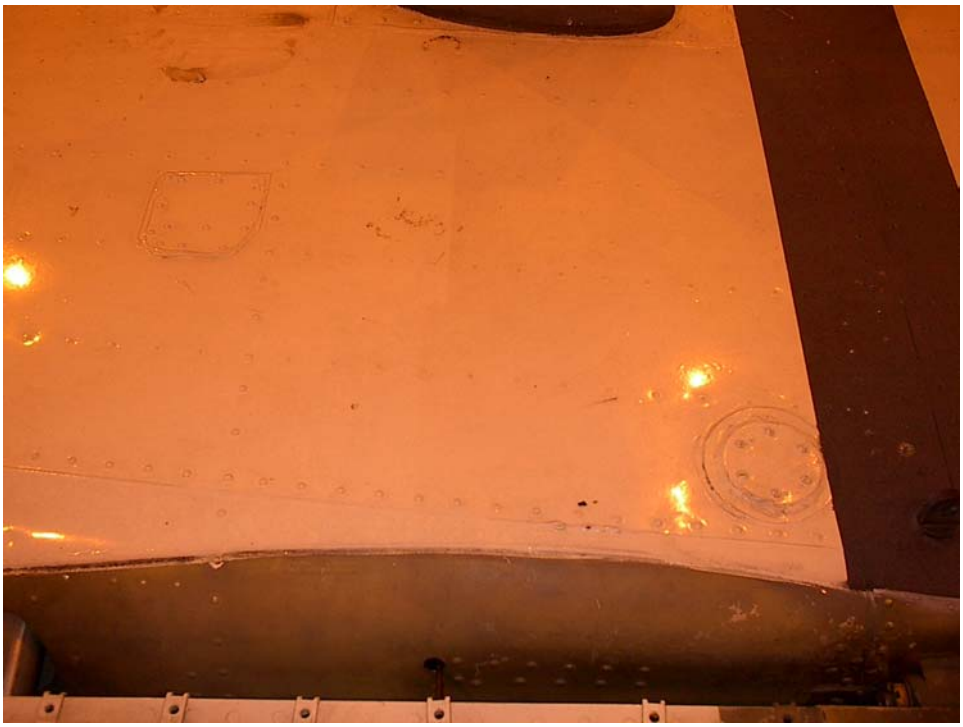
5.4.1.34. Floor panel assy. C3FS308-7 badly deformed.

5.4.1.35. LH forward cabin door has 2 non-standard sheet metal repairs.

5.4.1.36. Non-standard (unapproved) repairs to cabin roof top from station #224 to station #264.



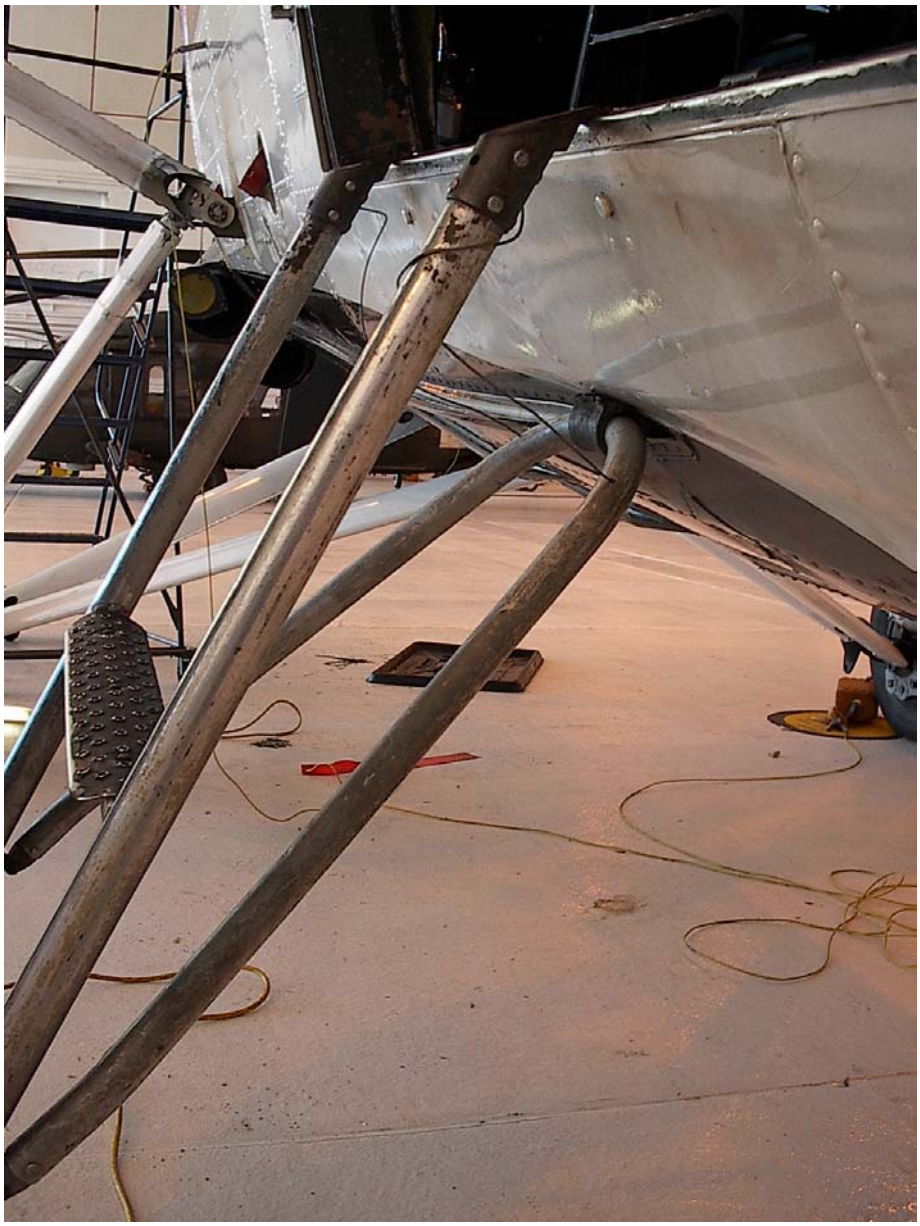
5.4.1.37. (2) Non-standard (unapproved) repairs to cabin roof top from station 139 to station #162.



5.4.1.38. Cabin sub floor #4 has 1 hole in AFT LH corner

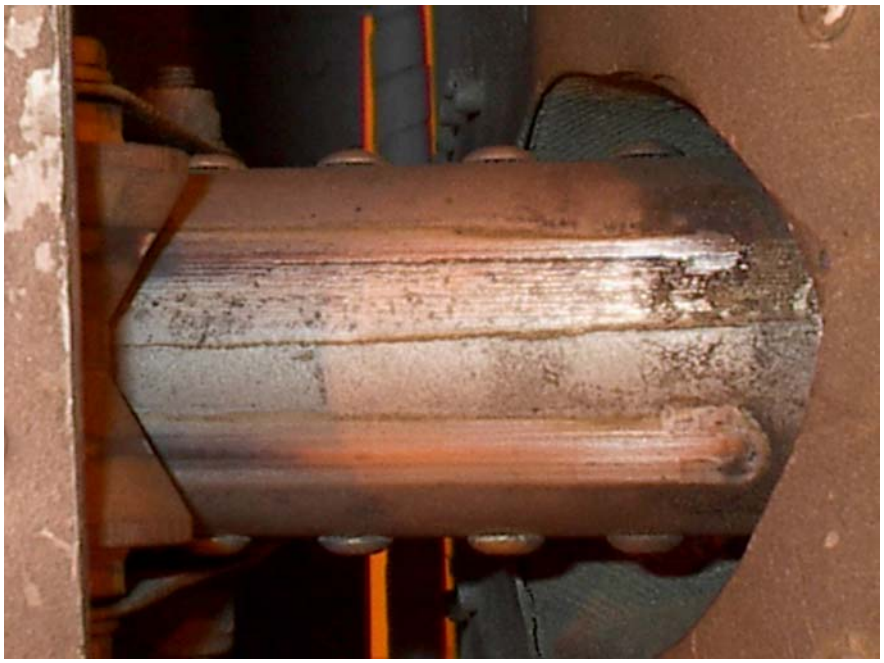
5.4.1.39. Dirt and FOD found under cabin sub floor.

5.4.1.40. Fuselage contact point for airstairs has internal damage, airstairs deform fuselage skin when weight is put on the stairs.



5.4.2. Wings

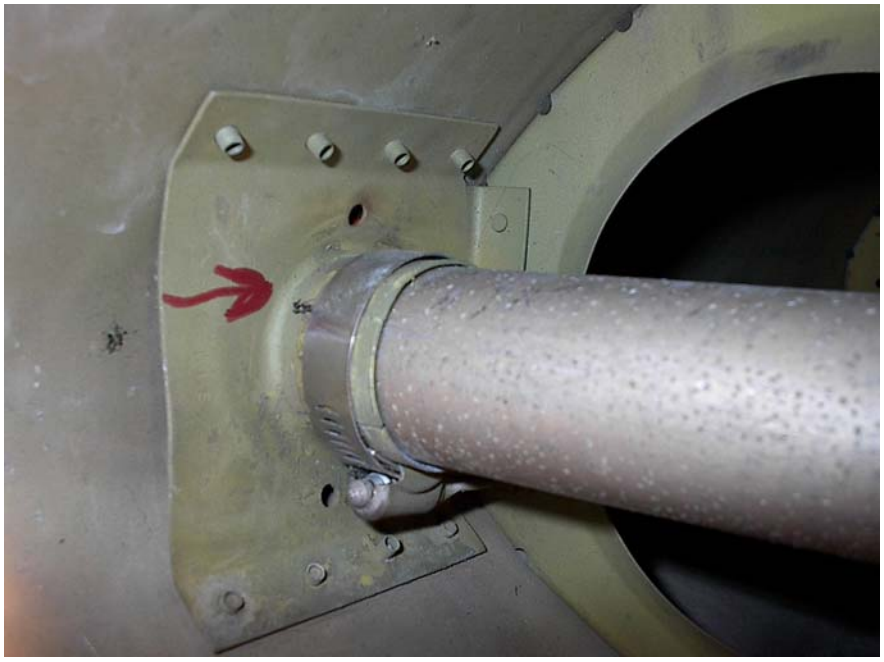
5.4.2.1. ***Possible Stress cracks on inboard flap push-pull control rod (Flap System) near rollers. Inb. of wing. CRITICAL***



5.4.2.2. ***RH inboard fore flap stop bumper deteriorating and double plate is cracked***

5.4.2.3. ***Wing 2 --- LH inboard fore flap stop bumper deteriorating and poor rivers on doubler plate (no picture)***

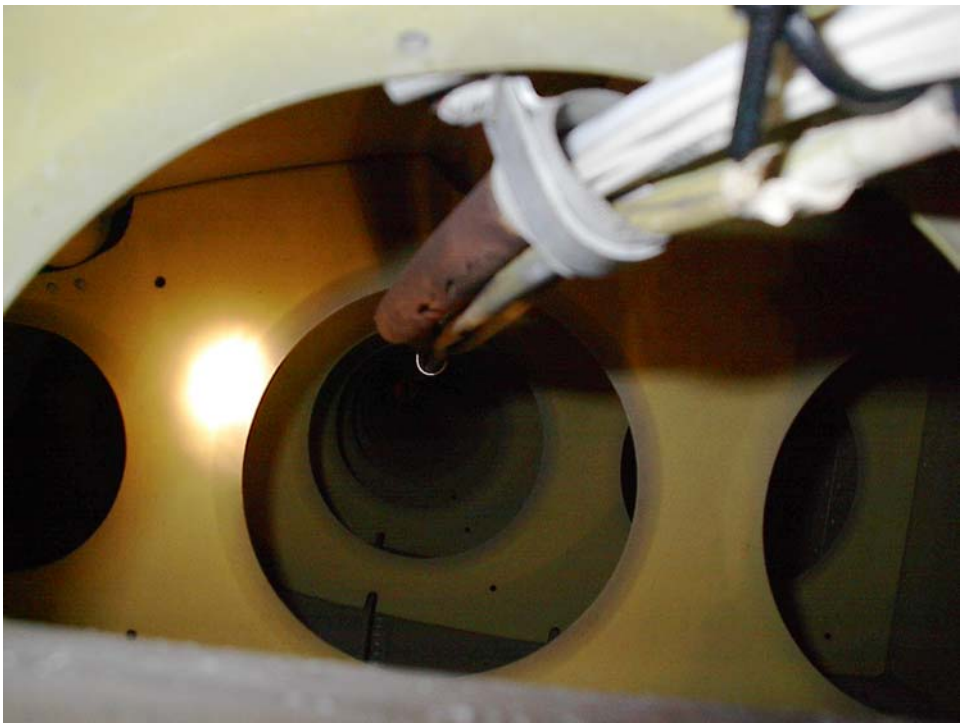
5.4.2.4. ***Wing 3 --- LH wing pitot mast support bracket cracked inside the wing leading edge.***



5.4.2.5. ***Some surface corrosion starting on R/H and L/H rear spar outboard of wing STN 247 pic. 87***

5.4.2.6. Some corrosion behind aileron pulley cluster. R/H and L/H wing. STN. 235 (no picture)

5.4.2.7. Wing electrical conduit cracked and broken inside LH outboard wing.



5.4.2.8. LH wing outboard aileron pulleys worn and corroded.

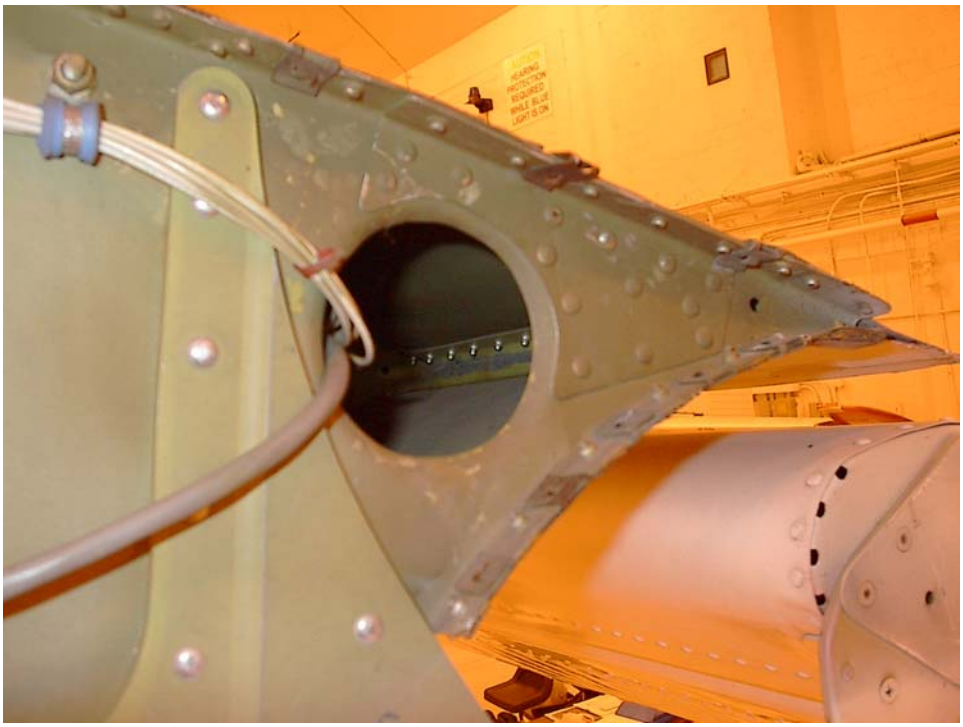
5.4.2.9. LH wing outboard front spar has surface corrosion next to the pulley bracket.

5.4.2.10. Paint missing on R/H aileron top surface and unapproved repair to T/E of skin.

5.4.2.11. Damaged skin on R/H inboard aft flap assembly

5.4.2.12. R/H and L/H outboard leading edge ribs are cracked.

5.4.2.13. LH wing has non standard repair on the outboard wing tip rib.



5.4.3. Empennage

5.4.3.1. Poor sheet metal practices at rear battery vent station #308.

5.4.3.2. Elevator and rudder trim cable pulleys worn and grooved at trim cable support bracket station #320

5.4.3.3. ***Extensive cracks in upper LH corner of bulkhead assembly. Pin-C3FS12-37 at station # 427.38 No repair scheme for damaged bulkhead (no picture)***

5.4.3.4. ***Cracks propagating from previously repaired area in upper RH corner of bulkhead pin-C3FS12-37 at station #427.38 (no picture)***

5.4.3.5. ***Rudder quadrant assembly bearings "dry" and require lubrication pin-B538 (no picture)***

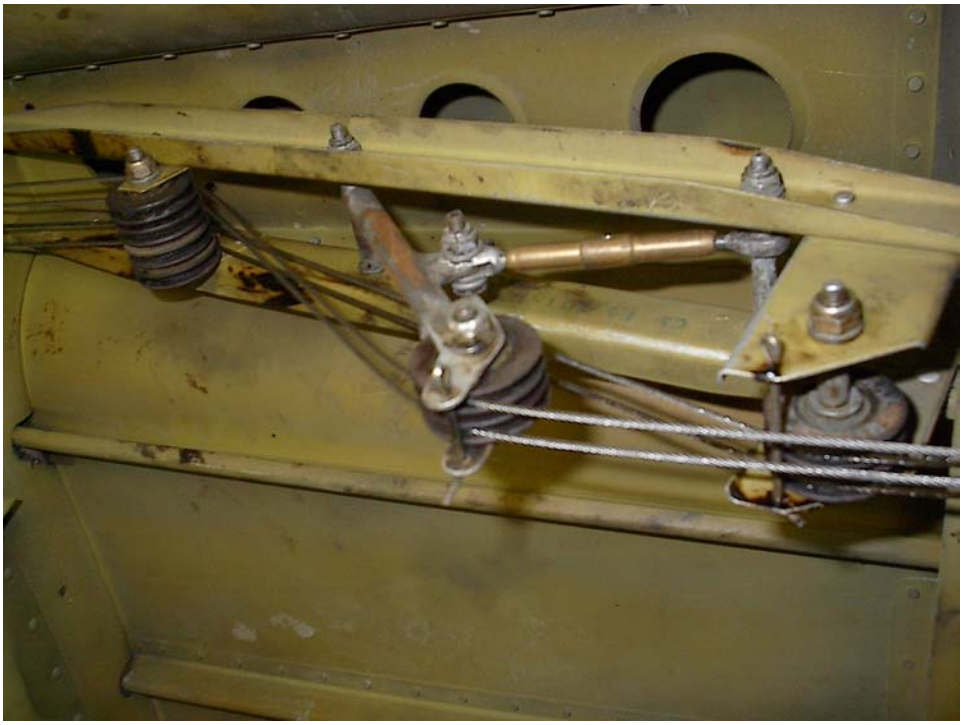
5.4.3.6. ***Elevator and rudder control cable pulleys worn and required replacement at mount bracket pin C3FS174-11 station #308 (no picture)***

5.4.3.7. ***Elevator trim tab assemble is not modified to recommended configuration of trim tab with mass balance weight mod # 3/909 (no picture)***

5.4.3.8. ***Unapproved battery installation (non certified) inside AFT fuselage battery tray. Only 1 vent tube hooked up. 1 vent tube left open***

5.4.3.9. Control cables pulleys worn and grooved at station #264 RH side

5.4.3.10. Worn and grooved control cable pulleys in pulley mount cluster station #305



5.4.3.11. Unapproved stringer repairs on R/H side fuselage aft of STN 264. Not I.A.W. SRM pg. 70 fig.4-16 (7 stringers in total)

5.4.3.12. Unapproved fuselage repair L/H side of fuselage aft of Cargo door between STN. 253-264 (no picture)

5.4.3.13. Unapproved fuselage repair R/H side of fuselage between STN. 294.0-308.0 near battery tray installation (no picture)

5.4.3.14. Surface corrosion on lower surface of support diagram forward of station #427.38 (no picture)

5.4.3.15. Stringer damaged in repaired area on LH side of upper dorsal fin (no picture)

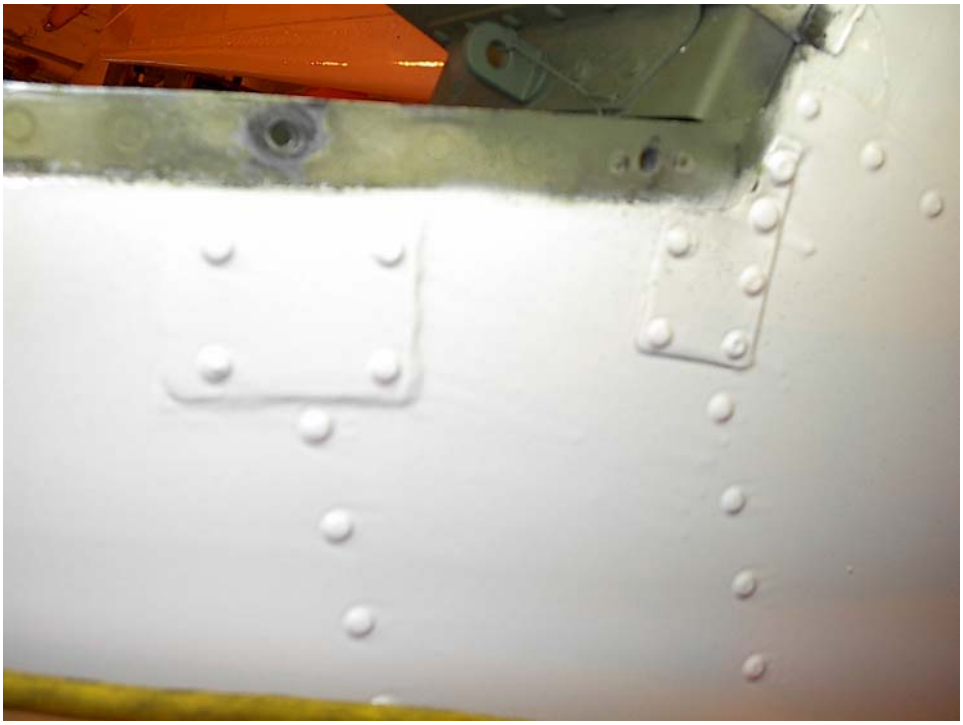
5.4.3.16. Non-standard (unapproved) sheet metal repairs in lower fuselage adjacent to pulley cluster at station 305 (no picture)

5.4.3.17. Non-standard (unapproved) sheet metal repair inside AFT fuselage at station #305 (no picture)

5.4.3.18. Non-standard (unapproved repairs) on upper LH elevator skin at the trailer edge

5.4.3.19. LH elevator inboard top skin has multiple layers of cracked and peeling paint making crack detection difficult.

5.4.3.20. Non-standard repair on LH side of dorsal fin next to rear lifting lug.



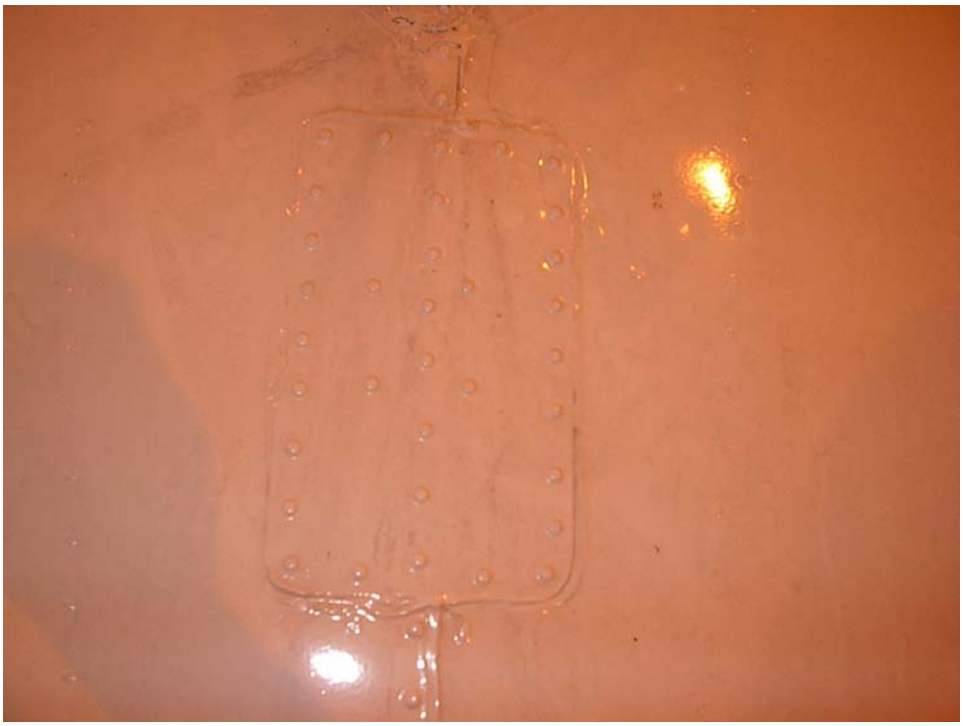
5.4.3.21. Non-standard repair on lower Aft RH fuselage between station #367-#384

5.4.3.22. Non-standard repair on LH and RH lower fuselage side skin adjacent to tail wheel shock strut

5.4.3.23. LH elevator trim tab has multiple layers of paint making crack detection difficult.

5.4.3.24. Unapproved repairs at outer LH empennage skin at station #280

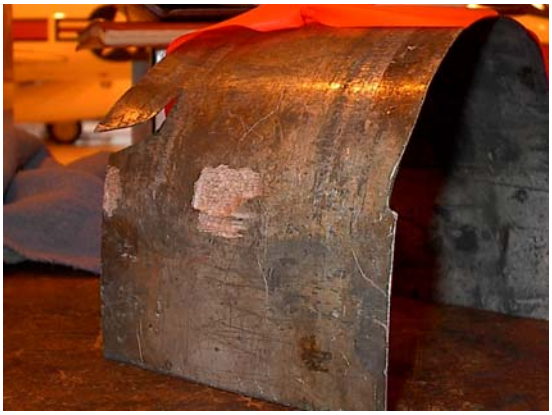
5.4.3.25. Non-standard (unapproved) sheet metal repair on top empennage just forward of dorsal fin at station #264



5.4.3.26. Sheet metal damage inside rear bulkhead at station #308

5.4.4. Engine

5.4.4.1. Many cracks, tears, etc. found on all heat muff baffles.



5.4.4.2. Engine 8 --- Vacuum relief valve is dirty and has FOD on the relief screen. (no picture)

5.4.4.3. 1 crack found on Part # C3EC 38-7 – this part is located on carb heat selector door.

5.4.4.4. Lower engine cowl air scoop fairing assy is badly oil canned

5.4.5. Airworthiness Directives and Service Bulletins

5.4.5.1. ***AD 76-08005: A/C does not comply with either Airspeed Indicator markings or flap interconnects mass balance weight mod. AD states that airspeed indicator. (Flutter effects – flap interconnect tab)***

5.4.5.2. ***RH outboard fore flap complied with LH outboard fore flap not complied with requires installation of stop bolt pin C3-WF 54-3 in outboard flap center hinge to prevent loss of aileron center hinge bearing***

5.4.5.3. ***Not complied with on RH and LH trailing flap control rod pin C3CF170-4 (Obsolete highly recommended incorporation of EB "0" 49***

5.4.5.4. ***Unable to confirm incorporation of MOD 3/772 engineering bulletin series "0" # 38 in wing flap jack***

6.0 Configuration Differences between US Navy TPS Aircraft and FAA Type Certificated Aircraft

The Navy NU-1B aircraft is civilian in origin and has a Type Certificate (A-815) issued by the FAA. The Type Certificate was used to establish the aircraft conformity status with regard to an FAA approved design as of the date of manufacture.

6.1.1. JATO Bottle Installation

No visual damage apparent on aircraft interior or exterior structure, from JATO bottle installation. Mounting holes and LH side shield still installed. Needs to be removed to confirm outside surface of empennage skin is not corroded.

6.1.2. Pitot Boom installation and instrumentation

A boom (pitch/yaw device)is located in the RH wing tip, attached to outboard wing RIB at station #335. Wing tip RIB reinforced with a 1/8" aluminum plate. Mounting plates are installed with (4) and 4 bolts and self-locking nuts. No cracks or damage found on adjacent structure.

6.1.3. Tail wheel micro switch

We were unable to confirm the requirement for an additional tail wheel steering switch installed on the airplane.

6.1.4. Miscellaneous installed equipment

Parachute racks

Avionics rack aft of co-pilot, and roof of cockpit.

Avionics rack aft of rear jump seats.

Camera power outlets (rear cabin)

Camera mount hatch (rear fuselage)

Outboard flap hangar deflection devices.

Shoulder belt retraction belts.

2 ceiling mounted Comm radios (aft fuselage)

2 instrument air vacuum ports (aft fuselage)

Periscopic sextant heater switch (roof mounted near flap jack)

6.1.5. Demilitarization requirements

Removal of military specific placecards

Perform Mod. Bulletin No. S003028, removal of door jettison devices, and installation of fire suppression system. **Note**: the above mod will not be required as the airplane does not have jettison doors, and already has fire suppression system.

Perform SB 3/52 – Installation of a supplementary data plate.